

Responses to Recommendations of the C0 IR Review Feb 18-19, 2004

BTeV Document #2668
C0 IR Project Team
3/22/04

The final report of the C0 IR Review of Feb. 18-19 can be found in BTeV Document #2625. This is the response of the C0 IR Project team to the Recommendations listed in Appendix D of that report. Responses are in italic type in the table below.

No	Responsible	Recommendations/Responses	Status	Date
<i>Section 1.1. – IR Magnets</i>				
1.1.1		Provide the required funds in FY2005 to allow the purchase of long-lead items, especially superconductor and collar steel.		
	<i>J Kerby, J Butler, S Stone, FNAL management</i>	<i>We agree strongly with these recommendations. The bid process for the collar steel could start immediately if funds were available. Potential vendors have been identified. We are re-examining the specifications for the superconductor to insure that they are complete and will guarantee a good product. Potential vendors have been identified.</i>	<i>In progress</i>	<i>3/22/04</i>
1.1.2		Decide on the configuration of the HTS leads and start the procurement process.		
	<i>J Kerby</i>	<i>A preliminary result from a recent test of one pair of HTS leads suggests that the number of leads required might be reduced by a factor of 2, resulting in significant cost savings from our current estimates. We have started dialogue with HTS lead vendors, and the interest level of the vendors will determine if we can achieve these savings. We visited one vendor in</i>	<i>In progress</i>	<i>3/22/04</i>

		<i>March and will visit two more vendors in April. In April we will also discuss with CERN their experience in the procurement of HTS leads.</i>		
1.1.3		Provide the required technical manpower to develop the corrector and spool designs to the level required for the project baseline.		
	<i>J Kerby, R Kephart</i>	<i>Spool design is progressing. Several ME's in TD are actively working on this, and we have added to the TD staff recently to augment the effort. 3 vendors for the fabrication of corrector magnets have been contacted. We have had detailed discussions with one vendor. One potential vendor for spool assembly has been identified.</i>	<i>In progress</i>	<i>3/22/04</i>
1.1.4		Identify the lead personnel for the magnet task, and define their responsibilities.		
	<i>J Kerby, R Kephart</i>	<i>Jim Kerby, John Tompkins, and Deepak Chichili are currently providing management and leadership for the magnet task. Their roles are specified in the C0 IR Management Plan (BTeV Document #2651).</i>	<i>In progress</i>	<i>3/22/04</i>
<i>Section 1.2. – Accelerator Physics and IR Optic(Linear Optics)</i>				
1.2.1		It is recommended that the current linear optics design be adopted as project baseline.		
	<i>J Johnstone</i>	<i>We strongly agree with this recommendation. We are confident that the design is robust and will satisfy the project requirements.</i>	<i>Complete</i>	<i>3/22/04</i>
1.2.2.		The committee recommends that the study of nonlinear aspects continues, with particular emphasis on identification of sources of shape modification of the tune footprint. Further, tracking should be carried out with software designed with tracking in mind.		

	<i>J Johnstone, R Dixon</i>	<i>We strongly agree with this recommendation. We have not yet been successful in identifying adequate personnel for long-term calculational support in AD. We continue to try.</i>	<i>In progress</i>	<i>3/22/04</i>
1.2.3		The analysis of particle loss and energy deposition should continue, including extrapolation to anticipated end-of-run-II luminosity levels and inclusion of detector sensitivities.		
	<i>N Mokhov</i>	<i>The beam halo calculations have been completed. The results will be included in the C0 IR “Advanced Conceptual Design Report.” Particle flux maps have been given to members of the BTeV collaboration to calculate the effects of beam halo on detector performance. We are awaiting their feedback.</i>	<i>In progress</i>	<i>3/22/04</i>

1.2.4		The committee does not advocate embarkment on a new design for corrector and adjustment magnets given the limited applicability in the project. The committee recommends that an analysis be performed of required field quality and distribution consistent with intended use.		
	<i>J Johnstone, J Kerby</i>	<i>We are not actively pursuing the “flat coil” design shown at the review. We have discussed alternative designs for the correctors from a vendor, and have solicited their input on design, cost, and schedule for these magnets. We have tabulated the measured higher harmonics of Tevatron spools and dipoles and have a better idea of the suitable range for new spool harmonics. So far, a simple tracking calculation has been done to verify this range. The first response from a vendor easily meets the harmonics requirements.</i>		<i>3/22/04</i>
Section 1.3 – Installation and Operations				
1.3.1		Assess the possibility of implementing a		

		better way to connect the C0 IR magnets and spools than is presently done at B0 and D0.		
	<i>M Church, J Kerby</i>	<i>Most new magnets will be required to interface to existing Tevatron magnets. Our design will insure these interfaces can be made up within the constraints imposed by the Tevatron tunnel and local infrastructure. We believe we have left adequate "slot length" such that these interfaces can be made up reliably. We are developing a 3-D model which includes tunnel civil construction and tunnel infrastructure to help understand how everything fits together in the tunnel.</i>	<i>In progress</i>	<i>3/22/04</i>
1.3.2		Involve the Fermilab alignment group at this time in the design of the IR magnets so that alignment of the magnets along the Tevatron beam line can be done efficiently.		
	<i>M Church</i>	<i>We have made a formal request to the head of the Alignment and Metrology Group to formally assign a member of his department to work with us on the C0 IR project. We are awaiting a response.</i>	<i>In progress</i>	<i>3/22/04</i>
1.3.3		Investigate possibilities for designing the C0 IR HTS leads to avoid the hipot problems observed with the HTS leads presently installed in the Tevatron.		
	<i>M Church</i>	<i>We are aware of these past hipot problems. A member of the C0 IR team (S Feher) was the project leader for the HTS lead project for Tevatron H-spools. This problem was solved for the H-spools, and we will be mindful of it in the new spool design.</i>	<i>Complete</i>	<i>3/22/04</i>
1.3.4		Assess the vacuum requirements in the beam pipe passing through the detector between the IR triplets, either to assure that the background rates are acceptable, or to redefine the specifications on the vacuum so that they are acceptable.		
	<i>V Shiltsev</i>	<i>Vacuum requirements for the C0 straight section are defined in beams-doc-877. This is not the responsibility of the C0 IR project at this time.</i>	<i>Complete</i>	<i>3/22/04</i>

1.3.5		Include in future presentations of beam simulations and energy loss simulations issues arising from the detector hall that affect operation of the Tevatron beam, such as the three dipole magnets in the detector hall.		
	<i>J Johnstone</i>	<i>We will include the 3 dipole magnets in the MAD model. We will document the physical aperture through the C0 region for injection lattice and low beta lattice in the C0 IR Design Report. This information is already documented in beams-doc-1013.</i>	<i>In progress</i>	<i>3/22/04</i>
1.3.6		Develop sufficiently detailed engineering designs of the subsystems and components so that detailed plans can be made to assure that sufficient time can be provided in the shutdowns in 2005 and 2009 to complete the work required.		
	<i>M Church</i>	<i>We concur with this recommendation. Some detailed layouts of new buswork, cryogenic modifications, qpm systems, shielding walls, lcw modifications, etc. have been started already. The shutdown scheduler in AD/MSD is currently working on a detailed shift-by-shift schedule for the 2009 shutdown. We will schedule as much tunnel work as possible to the 2006-2008 shutdowns (consistent with funding profile). We have confidence that a 2 month 2005 shutdown is adequate for our installation plans because of recent experience in installing the MI dipoles at C0. Nevertheless we will make a detailed shift-by-shift schedule for the 2005 shutdown also.</i>	<i>In progress</i>	<i>3/22/04</i>

1.3.7		Establish interlock enclosure boundaries and determine configuration control responsibilities of the Accelerator Operations Department, since this may have impact on installation of electrical infrastructure in the near future.		
	<i>M Church</i>	<i>No interlock control boundaries will be modified. We will install an ODH wall on either side of the collision hall.</i>	<i>Not started</i>	<i>3/22/04</i>

		<i>Configuration control and LOTO procedures will be defined for all new power supplies for the C0 IR magnets and separators.</i>		
1.3.8		Establish final names of magnets, power supplies, and other devices that will be in the controls system.		
	<i>M Church</i>	<i>Final names for all new power supplies have been established and are documented in the "C0 IR Advanced Conceptual Design Report." We will name (or rename) other devices in conformance with conventions previously established in the Tevatron. We will consult with operational experts in the Tevatron group on all names. We have already established "station numbers" for all new tunnel devices by agreement with the Tevatron group, MSD, and cryogenics group.</i>	<i>In progress</i>	<i>3/22/04</i>
1.3.9		Involve an operational person from either the Tevatron Department or the Operations Department who will be concerned with placement of power bus, water lines, utilities, etc. in the tunnel and service building.		
	<i>M Church</i>	<i>An operational expert from the Tevatron group has volunteered to serve in an advisory role. We are awaiting a formal assignment from the AD Head and Tevatron Department Head.</i>	<i>In progress</i>	<i>3/22/04</i>
1.3.10		Consider the possibility of creating another S-spool to be used at A49, and using a warm bypass in place of a cold spacer at both A49 and B11.		
	<i>M Church</i>	<i>Our plans for A49 and B11 maintains the current functionality. These plans are documented in the "C0 IR Advanced Conceptual Design Report." The Tevatron Department Head and a Tevatron operations expert have reviewed these plans. Any upgrades should be instigated, planned, approved and funded by the Tevatron Department Head.</i>	<i>Complete</i>	<i>3/22/04</i>
1.3.11		Consider planning for a completely new collimator installation at B48 rather than		

		using already installed components.		
	<i>M Church</i>	<i>Our current plan is to use the stands, motors, lvdt's, and some service building hardware from 2 unused collimators at E0 and F17. The actual collimator blocks we install at B48 will be new, because they need to be a different length than the collimators we have in hand. We intend to use the standard L-shaped design. A small modification to the stands is required. A bent-crystal collimator is not appropriate at this location.</i>	<i>Complete</i>	<i>3/22/04</i>

Section 1.4 – Schedule

1.4.1		The items noted in the Comment section above require time and effort to successfully accomplish. It is recommended that additional support be allocated to help Mike Church in the development of the IR Schedule.		
	<i>M Church</i>	<i>Deepak Chichili is now in charge of Open Plan cost and scheduling for the magnet subproject. In addition, substantial support and advice comes from the BTeV project office. We feel this is adequate to develop a complete WBS for the CD-2 reviews.</i>	<i>Complete</i>	<i>3/22/04</i>
1.4.2		WBS 2.8 “Commissioning” scope needs to be revised to contain the Technical Commission scope to meet CD-4 and move the other commissioning activities and cost to off project.		
	<i>M Church</i>	<i>The commissioning plan in wbs2.8 will be rescoped to include only hardware commissioning. No beam will be required.</i>	<i>In progress</i>	<i>3/22/04</i>

1.4.3		The replacement of the 54" Low Beta Quads require a warm up of each house. This type of thermal cycle takes approximately 2 weeks and substantial manpower. Preparing for this replacement to take place as soon as possible would be useful as a necessary repair could force a thermal cycle of one of these houses at any time. Replacing the needed devices during an unscheduled thermal cycle would result in BTeV gaining access to devices early as		
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		well as saving time in later critical shutdowns. This should be incorporated into the plan.		
	<i>M Church</i>	<i>We are currently planning to replace these devices in the 2008 shutdown. We will do this in an earlier shutdown if the funding profile is adequate. It is doubtful we can make this sort of replacement (warming up 2 houses) in an “unscheduled thermal cycle.”</i>	<i>Complete</i>	<i>3/22/04</i>
<i>Section 1.5 - Cost</i>				
1.5.1		Continue efforts to complete the BOE, contingency analysis, and inclusion of escalation prior to the upcoming CD-1 Reviews.		
	<i>M Church</i>	<i>We are working hard on this and making good progress. We do not anticipate being able to complete all BoE’s until the CD-2 reviews.</i>	<i>In progress.</i>	<i>3/22/04</i>
1.5.2		Provide clear definition of which costs are included as part of the project baseline and which are to be funded from the operating budget.		
	<i>M Church</i>	<i>We are gaining experience in the use of Open Plan and will soon be able to separate items by funding in an unambiguous fashion. This will require some discussion with FNAL and BTeV management.</i>	<i>In progress</i>	<i>3/22/04</i>
<i>Section 1.6 – Management</i>				
1.6.1		Clearly define a CD4 goal and final goal for the BTeV IR project		
	<i>M Church</i>	<i>The CD-4 goal will be to commission all new installed hardware associated with the C0 IR. The precise conditions will be documented in the C0 IR “Advanced Design Report” and reflected in the WBS.</i>	<i>In progress.</i>	<i>3/22/04</i>
1.6.2		Identify accelerator physics support as a level 3 WBS item, and appoint corresponding level 3 manager / team leader		
	<i>M Church</i>	<i>J Johnstone has been assigned as “Assistant C0 IR Manager in Charge of Accelerator Physics.” A line in the WBS structure has been expanded to include his</i>	<i>Complete.</i>	<i>3/22/04</i>

		<i>efforts and accelerator physics calculational activities during the project construction phase.</i>		
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